The components of elections: district heterogeneity, district-time effects, and volatility

Scott Morgenstern[*], Richard F. Potthoff

Department of Political Science, Duke University, Box 90204, Durham, NC 27708-0204, USA

Abstract

The quality and stability of democracy are often considered products of particular traits of parties or party systems. Studies of the 'personal vote' or 'district effects', the 'nationalization of elections', and 'electoral volatility', however, have generally conflated the different concepts at both the theoretical and empirical levels, thus raising questions about the independent relationship of each trait to democratic functioning. In response, we decompose district-level electoral data for parties in 20 countries from Europe and the Americas to clarify the conceptual dimensions along which parties and party systems may be compared. We show that what we term the 'district-time effect', 'district heterogeneity', and 'electoral volatility' are theoretically and empirically distinct properties of political parties with separable impacts on democracy, and we draw on this analysis to offer a new classification of political parties.
© 2004 Elsevier Ltd. All rights reserved.

Keywords: Comparative elections; District effects; Personal vote; District-time effect; District heterogeneity; Electoral volatility; Nationalization

1. Introduction

Political parties and party systems are core aspects of democracy, and thus analysis of electoral data has been a main occupation for political scientists. Both Americanists and comparativists rely on these data to provide indicators related to representation, stability, and the quality of democracy. But while there is an implied

---

[*] Corresponding author. Tel.: +1-919-660-4350.
E-mail addresses: smorgens@duke.edu (S. Morgenstern), potthoff@duke.edu (R.F. Potthoff).

assumption about the positive relationship among these democratic characteristics, previous analyses have failed to distinguish among the different dimensions of electoral performance. Further, attempts to find proxy measurements for each concept have generally failed to account for the other dimensions, thus yielding biased estimates of the dimension of interest. The result has been imprecise terminology and misleading assumptions about how parties are characterized by different combinations of electoral traits.

These problems are clear in the indicators developed to measure three of the most common concepts that illuminate the functioning of parties or party systems: what others have called 'electoral volatility', 'district effects' or the 'personal vote', and the 'nationalization of elections'. Authors such as Stokes (1965, 1967), Cain et al. (1987), Bartolini and Mair (1990), Coppedge (1998), Roberts and Wibbels (1999), Caramani (2000), and Jones and Mainwaring (2003) have generally focused on one of these concepts at a time (or two in the case of Stokes), always claiming a relationship of their indicator with a larger aspect of democratic functioning. Electoral volatility, for example, is generally taken as a sign of regime instability. In his encyclopedic study of the evolution of parties across Europe, Caramani argues that nationalization, which he defines as the degree to which a party's support is homogenous across the nation, has important ramifications for the 'standardization' of government processes, military socialization, social welfare, and economic policies (p. 68). For Schattschneider (expressed through the American Political Science Association, Committee on Political Parties, 1950), too much focus on local issues (what others have translated into district effects or the personal vote) is dangerous to democracy due to the implied neglect of national issues.

But the level of volatility, personal voting, or geographic heterogeneity in a party's support does not have the same impact on democracy or regime stability in all cases, in part because these are interactive, but not generally co-varying, characteristics. A party that scores low (or high) on one of the three concepts may score either high or low on another. Further, the parties within a given country may look quite different from one another on one or more of the scales. Conclusions about the causes or consequences of any of these concepts, therefore, should account for which parties carry the particular traits, and how those parties experience the volatility, personal vote, or degree of support homogeneity in relation to the other concepts.

There is also a methodological problem. Given their relative independence, indicators of these concepts based on electoral data may improperly attribute some electoral shifts to the singular variable of interest instead of separating out movements that should be attributed to other forces. A focus on overall volatility, for example, may attribute some electoral shifts to the national level that should be accounted for by local forces. Methodologies that fail to account for these other types of electoral variance therefore yield misleading (if not biased) indicators.

Not unrelated to the methodological issues, previous studies of these party characteristics have suffered from a conflation of terms and imprecise, if not ambiguous, definitions. 'National effects' and 'nationalization', for example, have taken on several different meanings, including the absence of a personal vote and homogeneously distributed electoral support. Further, 'district effects' and the

'personal vote' are distinct concepts, as either district or candidate characteristics can account for differing voter responses to campaigns and issues across districts.

Our response to these problems begins with a refining of the party traits. We keep the name *volatility* to imply the movement in a party's overall support across elections. But instead of the ambiguous terms 'nationalization' and the 'personal vote' or 'district effects', we offer two new statistically precise terms: *district heterogeneity* and the *district-time effect*. As its name implies, the first of these captures the degree to which a party's support is inconsistent across districts. Once accounting for a party's overall movement (volatility) and the spread of its support across the nation (district heterogeneity), the remaining, or residual, factors constitute our district-time effect. Our district-time effect, therefore, is akin to indicators for the influence of candidate or district characteristics on elections at a given time.

Our focus is on the weak theoretical and empirical links among these three concepts and a new classification of parties according to how they combine the different traits. Theoretically, we argue that there is little basis for expecting all parties that look similar in terms of one trait to look similar with respect to the other traits as well. Then, to test the relationships empirically, we offer a statistical methodology that simultaneously estimates clearly defined indicators of the concepts, which we use to classify a large sample of parties across Europe and the Americas. The empirical section allows us to establish that the three indicators measure separable, relatively independent, characteristics of parties. This leads us to the conclusion that there is no simple relation between any single party characteristic and the stability or quality of democracy.

The methodological implication of this conclusion is that statistical analyses that fail to separate out each of the concepts run the danger of generating biased results. To avoid the bias and conflation, we draw upon Stokes's (1965, 1967) components-of-variance model for ways to analyze the three concepts as independent aspects of electoral competition. Though we draw on Stokes's model, we argue that his and other similar models have important flaws and the interpretation of the effects is imprecise. The Stokes model, further, is not directly applicable to broad comparative analysis. Our alternative model corrects the statistical problems, offers precise definitions of the concepts, and allows application to a wide set of cases.

2. Previous literature

Three broad and generally separate sets of literature have tied indicators built from electoral data to the stability or quality of democracy. First, in a prominent and early attempt to address Schattschneider's concerns about the problems of weak parties and local-oriented politics in the United States, Stokes (1965, 1967) sought an indicator of the degree to which legislative elections turn on national issues, rather than constituency service, candidate qualities, and the provision of pork. His model helped to substantiate Schattschneider's claims about the large gap between the United States and the United Kingdom in terms of what Stokes called the 'district'

effect. To our knowledge similar models have not been applied to other countries, but similar concerns, often described in terms of the 'personal vote' (Cain et al., 1987; Carey and Shugart, 1995), have been at the foundation of studies that contrast the quality of political representation and the prospects for development in pork-ridden systems such as Italy, Colombia, and Brazil with more nationally centered party systems such as Britain's (Mainwaring, 1999; Geddes, 1991; Shugart and Carey, 1992; Haggard and Kaufman, 1995).

Out of a concern with accountability and representation in the short run and democratic consolidation in the long run, a second branch of literature relying on electoral data is concerned with the causes and consequences of electoral 'volatility' (Rose and Urwin, 1970; Bartolini and Mair, 1990; Coppedge, 1998; Mainwaring and Scully, 1995; Roberts and Wibbels, 1999), which is defined by changes in the parties' national level of electoral support. Bartolini and Mair, for example, work to counter the contentions about growing instability in European party politics. While other factors can cause electoral volatility, these authors explain that it has frequently been associated with a decline of longstanding cleavage structures, which 'encapsulate' and constrain political conflicts. It is also related to questions about the national consensus, the homogeneity of political culture, and the institutionalization of democracy generally. Roberts and Wibbels focus on Latin America, arguing that "electoral volatility is a function of short-term economic perturbations, the institutional fragilities of both democratic regimes and party systems, and relatively fluid cleavage structures" (p. 575).

A final body of work has focused on the 'nationalization' of elections, a term that applies to two different concepts. First, Stokes (1967), Katz (1973), and Claggett et al. (1984) have used it to discuss the degree to which a party's electoral support responds uniformly to national events or issues. This concept is thus related to Schattschneider's concerns. More recently Caramani (2000) and Jones and Mainwaring (2003) have used the term to apply to parties that have relatively homogeneous electoral support across districts. Caramani, however, ties his indicator to implications of the other conceptualization, arguing that as nationalization increases, "local candidates…lose their character of representing the local community. Rather they become the representatives of the national centre of the political organization" (p. 68). This, he continues, leads the voters to shift their attention from local to national issues. As a consequence of its effects on policy and the political process, Jones and Mainwaring add that nationalization has favorable implications for the survival of democracy.

3. Refining the definitions

In spite of statistical proxies for the 'personal vote' or 'district effects', 'volatility', and 'nationalization', the relationship of the indicators and the concepts has not been carefully examined. Further, since these concepts are all measured by examining the variance in electoral data, techniques that fail to account for all three types of variance simultaneously will necessarily bias the results. In other

words, if the variance in electoral returns is all attributed to the concept of interest, those results will be contaminated by the variance that should be attributed to other forces. In order to clarify the concepts and measure them through an integrated model, we provide new statistically defensible terminology, as illustrated through the following example.

Table 1 assumes two hypothetical countries, C1 and C2, each with three equally sized districts D1, D2, and D3. For both countries party P1 is assumed to have won 59% in D1, 53% in D2, and 47% in D3 for the first electoral year, Y1. This represents relatively consistent support across districts, or relatively low *district heterogeneity* (what others have referred to in terms of nationalization). In Y2 the overall average support for party P1 dropped by 10 points in both countries, representing a significant level of electoral *volatility*. The distribution of that loss, however, varied in the two countries. Country C1's party P1 lost exactly 10% in each district, while in country C2 the 10-point total loss between the 2 years is not distributed equally among the districts. The perfect consistency of the electorate's movements across districts and over time in country C1 would therefore yield a *district-time effect* equal to zero, but the effect would be considerably higher in country C2.

In sum, in a manner not dissimilar from common measures, our measure of volatility captures the degree to which a party's average vote (at the national level) is stable across electoral time periods. It should be high in countries where successful new parties form or the electorate easily shifts among parties. We apply the term district heterogeneity (DH) to conjure an image of the degree to which a party has inconsistent support across districts (what some have put in terms of low levels of nationalization). It should be relatively high for the US parties, since their support varies greatly between rural Kansas and metropolitan New York. Finally, the district-time effect (DTE) addresses the localism issue that concerned Schattschneider and Stokes. Having once accounted for movement over time and across districts, what is left is the effect of the idiosyncratic qualities and characteristics of candidates and districts. Stokes interpreted this as measuring the importance of the idiosyncrasies to the election (which others have related to the personal vote), apart from national events, and thus termed it the 'district effect'. As we detail below, Katz and others have argued that these idiosyncrasies may also yield systematic (but not uniform) responses of the districts to national events. Regardless of this interpretive distinction, the DTE captures the degree to which variance in electoral returns is accounted for by characteristics peculiar to districts (or candidates) *at a particular time*.

Table 1
Example: % support for party P1

District	Country C1			Country C2		
	Y1	Y2	Average	Y1	Y2	Average
D1	59	49	54	59	43	51
D2	53	43	48	53	49	51
D3	47	37	42	47	37	42
Average	53	43	48	53	43	48

4. Theoretical relations among the dimensions

DH, the DTE, and volatility are statistically precise definitions of concepts that other authors have discussed as indicators of democratic functioning. Theoretically, however, there is little reason to expect that the three indicators will have strong positive relations to one another, as each addresses a fundamentally different characteristic of parties or party systems.

First, DH and the DTE need not be tied together. For instance, where the variability of support across districts (DH) is large, local issues (reflected in the DTE) could play a large role, as in the United States, or a relatively smaller role, as in the United Kingdom (see Stokes, 1967; Cain et al., 1987). Second, the degree of volatility should not be related to DH or the DTE. The rise of a populist leader, for example, would yield high levels of volatility for the new party vehicle, as well as those parties from which the new leader stole support. The new party, however, could win relatively constant support across districts (yielding a low DH) or regionally concentrated support (yielding a high DH). The DTE for a party with high volatility would be low if the party's ups and downs are rather uniform across districts, but would be high otherwise.

If these concepts have only weak theoretical (or as we show later, empirical) relations, then studies that have a singular focus on the so-called 'nationalization', the 'personal vote', or 'volatility' will jumble together a number of very different party types, and conclusions about the impact of a single party characteristic could be quite misleading. The effect of party volatility on democratic stability, for example, should be dependent on DH and the DTE. Similarly, the impact of the 'personal vote' on campaign styles or government spending patterns will vary according to how parties' support is spread across the country and the stability of the party competition. Further, the next section shows that failure to account for the three concepts simultaneously leads to biased statistical indicators.

5. Modifying Stokes's components-of-variance model

In order to deal with the measurement and interpretive issues and also classify parties, we propose a modified version of Stokes's original models. Our alternative model, which is a standard components-of-variance model applied to district-level data, corrects a flawed statistical assumption in Stokes's model and allows analysis of a much broader set of countries. Our model, like Stokes's, also has the advantage of providing results at the party level, instead of aggregate country statistics, which is particularly important to studies of volatility.

Stokes's components-of-variance model broke down district-level electoral data into what he referred to as district, state (or regional), and national components. In contrast to the recent studies that we discuss below, his basic approach can capture both the static and dynamic aspects of electoral politics. Our modified version of his model thus helps us capture, in terms of country C1, the perfect parallel cross-time movements among districts, the important inter-district heterogeneity, and the degree of over-time consistency of party P1's aggregate electoral returns.

While we favor the Stokes approach for its ability to account for the multi-dimensional variance in electoral support, the specific model he uses requires two important adjustments. First, we argue that his model has one crucial flaw, regarding the assumption of fixed effects for the district and state elements. Second, for comparative work, the model requires an adjustment since, unlike the United States, most countries have two geographic levels as opposed to three.[1] As a result, while Stokes's model allows for elections that vary at three levels—district, state, and national—our comparative model only assumes two levels: district (which is equivalent to a province or state in most countries) and what he called national.[2] We argue further that the national component should be reinterpreted. As we explain below, while that component to a degree captures the national response that Stokes and others discussed when expressed as a percentage of the total variance in the system, as a raw figure it signals the level of change in a party's overall support. As such, it is an indicator of electoral volatility.

In order to explain the problem with the fixed-effect assumption and describe our alternative model, we first transform the Stokes model from three geographic levels to two. In addition to the national level, his model provides for districts, subscripted by j, within states, subscripted by i. By simply suppressing the j index and combining terms we are left with a model that has only two geographic levels. The two-level analog of his model then becomes

$$\text{Model A}^* : \quad y_{ik} = \mu + A_k + \beta_i + C_{ik} \quad (i = 1, \dots, I; \; k = 1, \dots, K).$$

Here, y_{ik} is the percentage of the total vote (received by the political party under consideration) in the election in district i at time k; K is the number of elections, or years, covered by the analysis; I is the number of districts; A_k is a nationwide random effect for time k, assumed to have mean 0 and (unknown) variance σ_A^2; β_i is a fixed effect (covering all years) for district i, providing for DH; C_{ik} is a residual effect, or random interaction effect, for district i and time k, assumed to have mean 0 and variance σ^2; and μ is a fixed effect representing the overall unweighted mean of the party's vote percentages across all districts and elections. As in the models that follow, Greek letters imply fixed effects and Latin letters imply random effects.[3]

In each model we consider (see Table 2), the letter name designates which effects are random. The asterisk refers to the inclusion, as opposed to absence, of a fixed

---

[1] A related difference between our model and that of Stokes involves his use of nesting. In his model he nests congressional districts within states, to account for systematic movements of all districts within a state. Claggett et al., alternatively, nest the districts (actually counties in their case) within regions. Neither of these techniques can be applied comparatively, because, among other reasons, most PR systems have only a single district per state (or province).

[2] An alternative to dropping the extra geographic level would be to assign a regional component to other countries that is analogous to the US states, as Stokes's (1967) UK application does. This strategy is inapplicable for most of our cases, since regions and districts are the same.

[3] In this and all other models, it is assumed that a party vote percentage, y_{ik}, is available for each district i at each time k. Special steps may be necessary to ensure that this assumption is satisfied if one encounters splitting, combining, birth, or death of districts or of parties. For all models it is postulated that all random terms are uncorrelated with one another—an assumption that is often unrecognized and probably not completely valid, but, one would hope, is not critical.

effect for the other component (e.g. A* implies a random effect for A and the inclusion of a fixed effect for B).

The substantive interpretation, and hence the labeling, of these components is critical. Stokes labeled what we call σ_A^2 (the variance component attributed to A_k) the national component, arguing that it captures the average or national movement of a party. This is rather imprecise terminology, however. In the example of Table 1, the σ_A^2 would relate to the 10-point aggregate change for the party. The degree of uniformity of response in the districts is captured in the residual. But σ_A^2 reflects the magnitude of a party's change in support, and is thus better interpreted as a measure of volatility. For country C2, our model would attribute the 10-point aggregate swing largely to σ_A^2 and use the differences in each district from that average (-6, $+6$, and 0) to estimate the residual component. We label σ_A^2 our 'time' or 'volatility' component, as it captures the variance of the party over time.

Because the β_i's in the model capture the variation in a party's average returns across districts, they provide a measure of what we label 'district heterogeneity'. Stokes discusses a similar concept, but we argue (see below) for a variation in how to model this concept.

Stokes reasoned that, after accounting for all his other effects involving time (national), state, and district, he would be left with changes that could be attributed to the local/ephemeral qualities of candidates or idiosyncratic district characteristics. He thus interpreted the residual—C_{ik} in our model—as measuring the 'district effect'.

Table 2
Estimates of variance components for each model

Model name	Model equation	Estimate of		
		σ_A^2; time or volatility	σ_B^2; district heterogeneity	σ^2; residual or district-time effect
A* (like Stokes)	$y_{ik} = \mu + A_k + \beta_i + C_{ik}$	$\hat{\sigma}_A^2 = (M_A - M_R)/I$	None[a]	$\hat{\sigma}^2 = M_R$
A (like Kawato)	$y_{ik} = \mu + A_k + C_{ik}$	$\hat{\sigma}_A^2 = (M_A - M_{BR})/I$	0	$\hat{\sigma}^2 = M_{BR}$
B*	$y_{ik} = \mu + \alpha_k + B_i + C_{ik}$	None[a]	$\hat{\sigma}_B^2 = (M_B - M_R)/K$	$\hat{\sigma}^2 = M_R$
B	$y_{ik} = \mu + B_i + C_{ik}$	0	$\hat{\sigma}_B^2 = (M_B - M_{AR})/K$	$\hat{\sigma}^2 = M_{AR}$
AB (preferred)	$y_{ik} = \mu + A_k + B_i + C_{ik}$	$\hat{\sigma}_A^2 = (M_A - M_R)/I$	$\hat{\sigma}_B^2 = (M_B - M_R)/K$	$\hat{\sigma}^2 = M_R$

The formulas for M_A, M_B, M_R, M_{BR}, and M_{AR} are given by

$$M_A = \frac{I \sum_{k=1}^{K} (y_{.k} - y_{..})^2}{K-1}, \qquad M_B = \frac{K \sum_{i=1}^{I} (y_{i.} - y_{..})^2}{I-1}, \qquad M_R = \frac{\sum_{i=1}^{I} \sum_{k=1}^{K} (y_{ik} - y_{i.} - y_{.k} + y_{..})^2}{(I-1)(K-1)},$$

$$M_{BR} = \frac{\sum_{i=1}^{I} \sum_{k=1}^{K} (y_{ik} - y_{.k})^2}{K(I-1)}, \qquad \text{and} \qquad M_{AR} = \frac{\sum_{i=1}^{I} \sum_{k=1}^{K} (y_{ik} - y_{i.})^2}{I(K-1)},$$

where, following Stokes' notation, the dot subscript (e.g. in $y_{.k}$) indicates the average over the replaced index.

[a] No component of variance because effect is fixed rather than random.

This latter term is also somewhat imprecise, however, since the residual has both a time and a district subscript. In other words, the residual captures the idiosyncratic movements of districts *and time* that are unaccounted for by DH or national-level volatility. The residual should be interpreted, therefore, as capturing non-uniform responses to national policy, as well as the importance of candidate characteristics and district peculiarities to the election. This leads us to adopt the phrase 'district-time effect' for σ^2.

The estimates of the variance components for Model A* are $\hat{\sigma}_A^2$ and $\hat{\sigma}^2$. Their formulas are provided in Table 2, which also covers other models.

Since β_i is a fixed effect, Model A* has just two variance components, σ_A^2 and σ^2, but not one that pertains to variability among districts. This seems to us an inappropriate assumption.

The decision to apply random or fixed effects is not always clear-cut. According to Jackson and Brashers (1994, pp. 5–6), random factors should be applied if the factors can be treated as if they were chosen at random from a population, if the sample could be replaced by another sample without changing the research question, or if the conclusions can be generalized to other levels of the variable. Our districts could arguably satisfy some or all of these conditions.

In fact, one can consider the districts (or the times, for that matter) to be drawn randomly from a superpopulation (Deming and Stephan, 1941). The super-population of districts would be the hypothetical infinite set of districts from which the actual districts could have been drawn.

Thus, we treat DH effects as random. The consequence of treating them as fixed (as does Stokes) is that an important source of variation is simply left out of the analysis. All the variation is then attributed to the time (national) and residual components, which is inappropriate.

Our approach is simply to replace Stokes's β_i with a B_i, where B_i is a random effect (covering all years) for district i, assumed to have mean 0 and variance σ_B^2. This yields

$$\text{Model AB}: \quad y_{ik} = \mu + A_k + B_i + C_{ik} \quad \text{(see last row of Table 2).}$$

In this model A_k and C_{ik} have the same expectations and variances as in model A*, and also σ_A^2 and σ^2 are estimated the same as before. We now require, however, expressions to estimate σ_B^2. Table 2 shows that $\hat{\sigma}_B^2 = (M_B - M_R)/K$ and also shows how to obtain M_B and M_R.

Under model AB, the statistic $(M_B - M_R)/K$ estimates (and has expected value of) σ_B^2. Under Model A*, however, $(M_B - M_R)/K$ does not estimate σ_B^2—because the model has no σ_B^2. Instead, this statistic has expectation $\Sigma_i (\beta_i - \beta_.)^2/(I-1)$, where $\beta_.$ is the mean of the I β_i's.

Though Model AB is our preferred model, it is important to discuss another variant, proposed by Kawato (1987). Kawato uses a different form of a components-of-variance model to reexamine Stokes's findings about the increasing role of national forces in US elections. His model, however, makes what we consider to be some untenable assumptions that result in the exclusion of certain sources of variation. He assumes a nested model of districts within states and states within the

nation.[4] To explain, we first modify Kawato's model as we did with the Stokes model to account for just two geographic levels (district and nation) instead of three (district, state, and nation). The two-level analog of Kawato's model is

$$\text{Model A}: y_{ik} = \mu + A_k + C_{ik}.$$

Because Model A is a nested model of districts within the nation, it has the same type of flaw as the corresponding three-level model. It is, however, a simpler model and therefore easier to present. Because of its nested nature, Model A has neither a random effect (B_i in Model AB) nor a fixed effect (β_i in Model A*) to take account of DH. In fact, it rests on the dubious assumption that variability among districts is non-existent, that is, that $\sigma_B^2 = 0$ in the context of Model AB or that all β_i's are the same in the context of Model A*. As a consequence, if variability among districts does exist, then the Model A estimates of both σ^2 and σ_A^2 (formulas are in Table 2) will be distorted, with the former estimate being inflated and the latter too low.[5]

Model AB treats time and districts symmetrically, whereas Models A* and A do not. That is, Models A* and A retain a random effect for time but not for DH. Why, one might wonder, would it not be equally logical to apply a model that has a random effect for DH but not for time? This query leads to the last two models that we cover,

$$\text{Model B}^* : \ y_{ik} = \mu + \alpha_k + B_i + C_{ik}$$

and

$$\text{Model B}: y_{ik} = \mu + B_i + C_{ik}.$$

---

[4] In regard to earlier works, our main emphasis in this paper is on examining their *models*, rather than the formulas used to estimate the variance components under those models. Nonetheless, we did examine estimation formulas as well as models. They are two distinct entities. There can be an inappropriate model but appropriate estimation formulas given that that model holds, or a suitable model but improper estimation formulas. Kawato's estimation formulas, as described in conjunction with his Eqs. (3)–(8), are entirely suitable given his (questionable) model. We had difficulty in figuring out both the model and the estimation formulas that Claggett et al. used. Among other issues: (i) no model equation is ever shown; (ii) the only two equations in their paper, (1) and (2), are both incorrect (in neither equation are the left and right sides equal); (iii) the cursory verbal descriptions (p. 87, p. 88) of their mathematical calculations indicate that the square root was taken at the wrong point (before rather than after division); and (iv) these descriptions omit any mention of the essential step of performing certain subtractions (as done, e.g. in subtracting M_R in our equations in Table 2). Stokes's (1965) estimation formulas are in his Appendix Eqs. (12)–(14). Although (12) is a proper formula, (13) and (14) evidently have typographical or other errors. One would probably expect (13) and (14), like (12), to be unbiased estimators (given his model) of the variance components that they are intended to estimate, but they are not. Of course, Stokes's numerical results could still be correctly calculated even though the printed formulas, (13) and (14), are not valid.
[5] Kawato applies his approach not only to (i) the vote percentages themselves but also to (ii) the changes in vote percentages between two successive elections. The objection that his method ignores district effects pertains just to (i), which is the only application that we consider here. It does not pertain to (ii), because the district effect drops out when the difference between two vote percentages in the same district is obtained. On the other hand, the formulas for estimated variance components that apply to (i) are not valid for (ii), because of the negative correlation between any two consecutive changes in a district.

Model B* is the same as Model AB except that A_k, a random effect for time k in Model AB, has been replaced by α_k, a fixed effect for time k. Model B is like Models AB and B* except that it has neither a random nor a fixed effect for time.

Of course, we mention Models B* and B not because we advocate them, but rather to give a fuller perspective. Although models like A* and A have appeared in the literature whereas models like B* and B apparently have not, there would seem to be little more reason to treat the effects for time but not DH as random than to treat the effects for DH but not time as random. We prefer both to conceive of districts as being drawn randomly from a superpopulation of districts and to conceive of times as being drawn randomly from a superpopulation of times.

Table 2 indicates the primary elements of all the models. They are differentiated as to which effects are included and whether these effects are treated as fixed or random.

There are methods to estimate variance components other than through the traditional formulas that we have used. These traditional formulas are consistent with the work of Stokes (1965) and Kawato (1987), and in most cases would appear to give results that differ little if any from those of other, newer methods. Although some other methods do avoid negative estimates of variance components, this problem did not arise often in our analysis.

6. Other approaches and critiques

Under different guises the concepts represented by DH, the DTE, and electoral volatility have been at the core of studies on electoral politics and representation. But, in spite of Stokes's fairly straightforward approach, comparativists have generally failed to tie the issues together either substantively or methodologically. Instead, comparativists have generally addressed single dimensions of the problem. For example, Caramani's historical study of Europe and Jones and Mainwaring's interesting study of the 'nationalization of parties and party systems' in Latin America only address the homogeneity of support across districts. These are both important works that offer compelling findings and useful methodological innovations. The example of Table 1, however, illustrates the problems with their unidimensional approach.

In the first of these studies, Caramani uses the coefficient of variation (standard deviation divided by the mean) to measure the spread of each party's electoral returns across districts. If the returns are relatively consistent, then the party is considered nationalized. He finds important variation across the countries of Europe, but his main finding is increased homogenization of districts over time. For both countries in Table 1, the standard deviation for party P1 in both years is 6, and thus for both countries he would calculate a coefficient of 6/53 in Y1 and 6/43 for Y2. His measure, however, would miss the perfectly parallel movement of the districts in country C1 and a lack of such parallelism in country C2.

It is important to note that Caramani calculated his statistics without regard to whether a party competed in all districts. This may be defensible since part of his interest was to show increasing levels of coverage for the parties and in most of

Europe parties do compete in most districts as a result of proportional representation rules. But the model will overestimate the degree of variability in countries (e.g. the United States) where plurality rules encourage major parties not to compete in all districts. As we discuss below, we therefore followed common practice and excluded non-competitive districts from the analysis.

Jones and Mainwaring have a goal similar to Caramani's in their tests for Latin America, though they use a Gini coefficient as their measure of inter-district homogeneity. Like the coefficient of variation, the Gini coefficient yields a scaled statistic that is useful in comparing results among countries or over time for a single country.

While they do provide interesting comparisons, these two works, in focusing solely on homogeneity of districts, have important limitations. For example, the measures are flawed, in that they effectively conflate the issues of DH and the DTE, even though seemingly they purport to assess only DH. While it is useful to have a statistic that points to the different levels of Democratic support in Massachusetts and Utah, it is also interesting to know whether a scandal or its inverse in Washington produces consistent changes in the votes in the two states. It is important as well to capture the degree to which the Democrats retain relatively consistent support across time. In terms of country C1 in Table 1, the Caramani and Jones/Mainwaring approaches would capture the important static differences among districts D1, D2 and D3, but not the relatively volatile average support for the party across time nor the remarkable consistency in the movements across time for the P1 party. Moreover, offsetting district support levels go undetected with either approach; if P1's vote totals for D1 and D2 are interchanged for year Y2 as shown in the comparison of C1 and C2, the statistics for homogeneity across districts will not detect the difference (i.e. they yield identical results for C1 and C2).[6]

A straightforward way to capture the consistency of movement of the districts would be to compare the swing—the change in the electoral returns for a party across two elections—for each district. The standard deviation of the district-level swing would give a sense of the degree to which districts move together and hence could be interpreted as measuring the importance of local factors in an election. If all districts gained or lost a similar proportion of the vote across two elections, then the standard deviation would be small. This would indicate that national events have a similar impact across districts—or in the sense of the word suggested by Stokes, that the election is 'nationalized'.[7] In the above example, for country C1 party P1

---

[6] A final problem with either approach is that for two-party systems, the results depend on which party is chosen as a reference. In Table 1 (e.g.), if besides P1 there is only one other party (P2), then in either country the coefficient of variation for Y2 is 6/43 for P1 but 6/57 for P2.

[7] There is an important distinction between the 'national effect' and a nationalized election (or nationalization). Stokes and Schattschneider use the term 'nationalization' to discuss the impact of national events on elections. As such, Stokes terms an election nationalized if his district effect (what we call the DTE) is small. As we explain above, what he terms the 'national effect', however, is closer to our measure of volatility. The confusion grows if we bring in Caramani and Jones/Mainwaring, who use the term nationalization to reflect the idea of low DH.

had a swing of −10 points between year Y1 and Y2 in all districts and thus the standard deviation of the swing was zero. Of course, a model looking solely at this indicator would suffer from the same incompleteness as the studies on district homogeneity.

It is important to note that this notion of nationalization is not uniformly accepted. As Katz (1973) and more recently Brady et al. (2000) have argued, different sub-groups of the population should be expected to respond differently to issues. New gun control legislation, for example, might harm the Democrats in the South, but help them in the North. These authors, therefore, argue for measures of non-uniform responses to national phenomena.

While this is a cogent argument, Stokes (1973), before turning to a criticism of Katz's methodology, argues in a comment that he tested for non-uniform responses and found them to be negligible.[8] He argues further that uniform responses are interesting phenomena that inform analyses of congressional behavior. Claggett et al. (1984) concur, as the consistent responses indicate the degree to which "the distinctive regional political cultures and traditions are being replaced by a more similar mixture of political sentiments across the nation" (p. 80). Further, they argue, while Katz's singular interest in distinguishing between national and local stimuli leads him to "lump uniform and non-uniform responses together" (p. 83), Stokes's model does separate out the uniform effect. Claggett et al. also quibble with Stokes, arguing that his measure of the 'district effect' may contain elements of non-uniform responses to national events as well as the impact of candidates and local effects. We concur with their interpretation and their general approach, but we are concerned about important errors in the published formulas and apparently faulty techniques in estimating the components of variance.[9]

Brady et al. are also interested in non-uniform responses, and argue for a regression model of nationalization that includes as predictors of mid-term House vote the earlier vote for the president (which is supposedly national) and that for the member of Congress in the district. Their measurement, however, still conflates DH with the DTE. Further, their measure may still fail to capture the differential effect that some policies would have in different districts. If the president became identified with a policy (such as gun control) that drove support in different directions, then the coefficient on the vote for the president in the previous election could be near zero, since the regression (roughly) computes the average effect. Aside from these issues, the Brady et al. model is not applicable to countries that do not employ mid-term elections. As such, their model is incapable of addressing comparative issues.

Finally, the degree to which parties receive inconsistent support across time, volatility, has provoked studies of both Latin America, where some parties have risen and fallen in dramatic fashion, and Europe, where there was a perceived increase in

---

[8] We are unable, however, to understand precisely what statistical reasoning and statistical techniques Stokes used to reach this conclusion. Although he briefly indicates that he somehow tested covariances and correlation coefficients, such tests are not standard in variance-components analysis and it is not clear how they could have been suitably done.

[9] See footnote 4 for details.

volatility since the 1970s that many associated with the breakdown of traditional cleavage systems (Lipset and Rokkan, 1967). While the debate about causes and consequences and even the interpretation of data[10] rages, the single-dimensional statistical techniques used to measure volatility have not generated much controversy.[11] Most studies have settled on the Pedersen index, which, as Mainwaring and Scully (1995, p. 6) explain, is calculated ''by adding the net change in percentage of seats (or votes) gained or lost by each party from one election to the next, then dividing by two. An index of 15, for example, means that some parties experienced an aggregate gain of 15 percent of the seats from one election to the next while others lost a total of 15 percent''.

As with the studies of district homogeneity or inter-election swings at the district level, volatility as measured by the Pedersen index is a useful and interesting concept, but its unidimensionality calls into question its statistical utility. For example, Roberts and Wibbels's report of minimal volatility between the 1993 and 1997 elections in Chile ignores the heterogeneity across districts and neglects the very sharp changes in support that our analysis uncovers at the district level. Similar problems would arise in applications to the United States or the United Kingdom. Studies of volatility based on the Pedersen index or similar measures also have a problem in that they aggregate all parties in the calculations and statistics therefore fail to reflect the relative movements within the system. By contrast, our method can provide separate scores for each party, alliance, or 'block' (Bartolini and Mair's focus). Further, studies of volatility are generally mute on the subject of whether the changes are experienced differently around the country, which could be quite important to conclusions about the relation of volatility and cleavage structures. Lastly, the Pedersen index distorts volatility scores, in that all variance in elections is attributed to this one party trait, rather than the three that we have identified.

7. Applying the model

7.1. Results for hypothetical cases

In order to assess the validity of the different approaches, we first apply our model (AB) to the simple two-year, three-district example of Table 1. The analysis yields respective estimates for time, DH, and the DTE of $\hat{\sigma}_A^2 = 50$, $\hat{\sigma}_B^2 = 36$, and $\hat{\sigma}^2 = 0$ for country C1 and $\hat{\sigma}_A^2 = 44$, $\hat{\sigma}_B^2 = 18$, and $\hat{\sigma}^2 = 18$ for C2. The square roots of these values give estimates of the standard deviations of the effects. For C1, the estimated standard deviation for DH ($\hat{\sigma}_B$), for example, implies that about two-thirds of districts would fall within six points (the square root of 36) of the mean district-level support. The estimate for the volatility component ($\hat{\sigma}_A = 7.1$) is consistent with

---

[10] Bartolini and Mair, for example, largely debunk the notion that Europe experienced an increase of volatility in the 1970s.

[11] Bartolini and Mair note: ''there has been remarkably little debate or disagreement concerning the actual mathematical formula from which the index of aggregate volatility is derived'' (p. 20).

a significant change in the party's support across the two elections, and the perfectly tandem movement of the party's vote across the districts is captured with the zero value on the estimate for the DTE ($\hat{\sigma}$).

The alternative models provide misleading or incomplete results. For both C1 and C2, Stokes's model would yield the same values as ours for $\hat{\sigma}_A^2$ and $\hat{\sigma}^2$ but would not produce a $\hat{\sigma}_B^2$ at all. Kawato's model ignores $\hat{\sigma}_B^2$, and for both C1 and C2 it would calculate $\hat{\sigma}_A^2 = 38$ and $\hat{\sigma}^2 = 36$. It produces bias, as it underestimates σ_A^2 and overestimates σ^2 for both countries. Another problem with the Kawato model (as with the Caramani and Jones/Mainwaring models) is that it yields identical results for countries C1 and C2. In contrast, our preferred model (AB) accurately reveals important differences between the hypothetical countries.

The measures proposed by Caramani and Jones/Mainwaring for DH also yield misleading results. The problem with these measures is that they reflect the DH component and the residual component combined. Note that for both C1 and C2 the sum of our $\hat{\sigma}_B^2$ and $\hat{\sigma}^2$ is 36, the square root of which (6) is the standard deviation of the party's vote percentages across districts that Caramani's method would obtain for each year.

Finally, the standard calculation of volatility may also be questionable. The Pedersen index only accounts for the movement at the national level and thus yields the same score (10) for both countries. But variation attributed to DH and the DTE should be taken into account when estimating volatility, and doing so yields different indicators for these two countries. We therefore prefer the values of the variance components for time (50 for C1 and 44 for C2), or their more directly interpretable square roots (7.1 and 6.6), as indicators of volatility.

7.2. Results for actual cases

In order to explore the relationships between the three different indicators of representation, we estimated the variance components for all major parties or alliances in Europe, Canada, the United States, and every Latin American country for which data were available, the only other requisite being that the average district vote for the party was at least 15% in the last election in our series and that the competition was consistent enough to allow cross-temporal and cross-district tests. We constructed a single data set for each of the cases covering the most recent period with at least three consecutive comparable legislative elections.[12] Future case studies may find other approaches useful, such as using states and presidential elections instead of districts and congressional elections for the United States. The legally defined legislative electoral districts, however, provide the most comparable data for a multi-country study. Table 3 displays our results, and the appendix and

---

[12] There are two exceptions. First, although the most recent series of three UK elections with no boundary changes was 1974–1979, two of these elections occurred in one year. We thus focus on data for the five elections from 1955 to 1970. Second, we include Canada, in spite of its not having recently held more than two consecutive elections with unchanged district borders, in order to include a third country that employs single-member districts.

Table 3
Components-of-variance estimates

Country	Elections		Districts	Party	Average	Estimates for:		
	Years	No.	No.[a]		vote[b]	Time	DH	DTE
Argentina	1991–1999	5	24	Peronists	45.7	10.6	86.0	54.9
				Radicals	24.4	50.5	77.2	61.8
Austria	1971–1994	7	9	Socialists	33.9	27.6	63.7	3.1
				People's Party	28.7	45.0	63.0	2.8
Brazil	1990–1998	3	27	PMDB	19.2	1.6	77.0	53.9
				PFL	19.9	2.1	87.0	76.3
Canada	1988–1993	2	271/295	Conservatives	16.3	320.5	41.4	61.8
				Liberals	43.3	55.0	201.1	43.6
Chile[c]	1989–1997	3	60	Concertación	58.7	−0.4	33.8	48.9
Colombia	1974–1986	4	26	Conservatives	35.2	8.3	72.3	17.2
				Liberals	45.2	18.1	64.1	41.8
Denmark	1971–1998	12	17	Social Democrats	35.7	15.9	14.6	4.8
				Liberals	24.5	25.5	40.3	2.5
France	1978–1993	5	96	Socialists	20.8	62.2	25.8	6.6
				Rightist coalition	45.4	5.2	47.2	6.3
Germany	1957–1987	9	10	CDU/CSU	41.9	3.7	53.2	6.1
				Social Democrats	38.7	18.9	36.0	5.3
Iceland	1959–1995	11	8	Independence	32.4	11.3	51.8	8.2
				Progressives	30.2	17.5	115.5	8.6
Italy	1972–1983	4	94/95	Christian Democrats	34.5	6.6	77.6	4.3
				Communists	30.2	8.2	109.0	2.0
Netherlands	1986–1998	4	20	Socialists	29.2	17.0	41.0	5.2
				People's Party	25.4	17.6	33.7	1.9
				Christian Democrats	17.0	67.4	43.0	6.9
Norway	1973–1997	7	19	Socialists	35.5	11.4	54.5	6.4
Portugal	1975–1995	9	20	Socialists	44.1	56.6	23.3	12.7
				CDS/PSD	44.9	35.0	231.2	16.3
Spain	1982–1996	5	52	Socialists	38.2	8.6	67.1	9.9
				Popular Alliance	42.6	38.5	100.9	11.4
Sweden	1948–1991	15	28	Moderates	19.9	10.3	18.0	5.3
				Social Democrats	39.1	5.6	32.3	4.0
UK	1955–1970	5	235/618	Conservatives	40.9	9.2	125.2	9.1
				Labour	50.5	4.6	267.4	10.3
USA[c]	1984–1990	4	234/435	Democrats	52.5	2.1	242.8	51.3
Uruguay	1984–1994	3	19	Reds	38.4	25.4	24.0	3.2
				Whites	42.3	31.4	45.7	5.5
				Broad Front	19.3	26.0	59.2	3.3
Venezuela	1968–1983	4	23	AD	53.2	37.5	104.4	15.1
				COPEI	27.9	35.7	48.2	25.1

   [a] Number of districts in the system. Where some districts were not used, the numbers indicate included/total districts. Caramani's time series provides data for 10 German Länder and 96 French provinces rather than for single-member districts.

   [b] Unweighted average of vote percentages across districts, for last year in series.

   [c] When the analysis is based on just two parties (USA) or coalitions (Chile), the figures other than average vote are identical for the two competitors.

accompanying website provide our data and details about the selection criteria and the computer programming.

The three single-member-district countries frequently change their electoral borders, thus preventing the use of long time series in the analysis. More importantly, in these systems major parties frequent fail to present a candidate in some districts, thus skewing the data. We therefore followed Stokes and Kawato in eliminating districts that were either substantially uncontested or where the pattern of competition varied within the time period. Other approaches, however, are feasible and the magnitudes of the effects do change under alternative specifications.[13] Our other 17 countries employ some variant of a proportional representation (PR) electoral system, and thus major parties or alliances compete in every district.[14] In a few cases their vote totals dipped quite low, but these values appear as normal variation in their support.

The case selection rules do bias the results in the sense that the included parties had to have at least minimal support and were not so volatile as to have lost all their support in any year.[15] But the rise or fall of parties not included in the analysis will be reflected in the statistics for the other parties. What our numbers will reflect is how the changing availability of votes that results from the birth or death of a party is captured by the other parties. The average change in the other parties' support will be captured in the volatility component, and the residual component will capture the degree to which the change is uneven across districts.

Table 3 portrays the raw estimates of the analysis, providing several windows on the nature of electoral competition among regions, within countries, and both among and within party families. Several patterns are readily evident, each with implications for explanatory variables. First, while the parties of some countries all share common combinations of traits, other countries house very different types of parties. This suggests, generally, that system-level variables are insufficient explanations for the patterns. Country-level variables, for example, cannot explain why the volatility rates vary not only among countries but also among parties or coalitions within countries. There is some evidence that one system-level variable, the executive system, does influence the level of local focus in elections, since notwithstanding the few outliers (e.g. Canada and Uruguay), the DTE is much greater in presidential systems than in parliamentary systems. But, while a large literature (e.g. Duverger, 1954; Carey and Shugart, 1995) contends that the electoral system has large impacts on parties and the party system, our results do not substantiate such claims.[16] Similarly, while the parties in the three single-member-district countries (with their large numbers of districts) generally have high DH and

---

[13] For more information about handling of districts with non-competitive races, see Appendix.

[14] There was one exception: we eliminated one Italian district where not all parties competed.

[15] In some cases it was necessary to conduct the analysis on alliances rather than parties. If the alliance was short-lived, we ran the model as if the two (or more) parties were in alliance for our complete time series. For some countries (such as Ireland), however, the frequent changing of parties and/or districts was too great to overcome. See appendix for more information.

[16] Our first-cut statistical analysis found no evidence that electoral-system incentives to pursue the personal vote (Carey and Shugart, 1995) have significant impacts on DTE, DH, or volatility.

DTE, so do some parties that operate in PR systems. The number of districts involved seems, therefore, to play some role in determining these traits, but it is not the only factor.[17]

There are also interesting findings for individual countries. In Canada, for example, the extremely high time component is a function of the shocking collapse of the Conservatives and the NDP in 1993, along with the rise of the Reform Party. What may be less well known is how unevenly the change was absorbed across the country, which the high DTE captures (a result that holds even if Quebec is left out of the analysis). Second, as mentioned earlier, the very stable vote percentages for the Chilean coalitions have masked quite large swings in some districts. Analysts of Canadian and Chilean politics, therefore, should consider candidates and district issues in addition to the national politics. Third, while the US parties are often distinguished from their British counterparts, the statistics indicate some important similarities. In particular, while not unique, relative to others these countries combine very heterogeneous support across their nations, relative stability over time, and a significant role of local forces in their elections. At the same time, while not shown in the table, the US and British parties have separated on the DTE in recent decades, as the DTE has been relatively stable in Britain but has grown considerably in that country's former colony.[18] This is noteworthy given Schattschneider's great concerns with what, at the time he was writing (the 1950s), were much smaller differences.

Developing these and other comparisons is beyond the scope of this paper, and though we do discuss them briefly in the conclusion, we must also leave explanations of the patterns for future work. In what follows, therefore, we will concentrate on categorizing the parties and testing our proposition about the very weak link among the three variance components.

The primary confirming evidence about the weak theoretical links among the three party characteristics comes from correlational analysis. The Pearson correlation coefficients among the components are quite small: -0.12 between the time (volatility) and the DH components, 0.28 between time and DTE, and 0.24 between DTE and DH. Because of skewness, it appears better to apply the tests to the ranks instead of the actual values. With Spearman's rank correlation coefficient, the relationship between DH and the DTE rises considerably to 0.42 but is still far too weak to conjoin these components into a single-dimensional continuum. The relation between time and DH remains weak (-0.18), and that between time and the DTE becomes far weaker (-0.03). The weak relations are confirmed in Table 4, which shows that there are empirical examples of all eight theoretically possible combinations of the three components.

---

[17] For the set of 39 cases in Table 3, the Spearman rank correlation coefficient for the number of districts analyzed versus DH is 0.30 and versus DTE is 0.43.

[18] For Britain, we ran additional analyses for 1974–1979 and the two consistent-boundary elections of 1983–1987. Likewise, we ran additional US analyses for the 1950s and 1970s. The DTE values for the UK parties ranged between 5.7 and 10.3 for the three time periods, but the US DTE rose from only 19.6 for the 1950s to much higher values later.

Table 4
Classifications of parties

| | | High volatility | | Low volatility | |
| | | District heterogeneity | | District heterogeneity | |
		High	Low	High	Low
District-time effect	High	Argentina Radicals Canada Liberals Colombia Liberals Iceland Progressives Portugal CDS/PSD Spain Popular Alliance Venezuela AD	Canada Conservatives Portugal Socialists Venezuela COPEI	Argentina Peronists Brazil PFL Brazil PMDB Colombia Conservatives Spain Socialists UK Conservatives UK Labour USA	Chile coalitions Iceland Independence
	Low	Austria Socialists Austria People's Party Uruguay Broad Front	Denmark Liberals France Socialists Germany Social Democrats Netherlands Christian Democrats Netherlands People's Party Uruguay Reds Uruguay Whites	Italy Christian Democrats Italy Communists	Denmark Social Democrats France Rightist coalition Germany CDU/CSU Netherlands Socialists Norway Socialists Sweden Social Democrats Sweden Moderates

'High' means at or above the median of the raw components of the 39 cases.

In addition to providing evidence about the relationship among the electoral traits, Table 4 offers a new typology of parties and party systems. Unlike other categorizations, here only one category is unique to a single country, and the parties of a given country often fall into different boxes. Moving left to right through the table by rows, the following describes the categories.

7.2.1. Volatile and heterogeneous support with a high DTE

The cases that fall into the upper left box epitomize the concerns of party theorists. The sharp shifts in these parties' support may have root causes in economics or other national issues, but they are likely reinforced by the parties' regional nature and the important element of localism in the elections. As a result, the support of these parties is heavily dependent on the candidates they choose and the parties' ability to sell their platforms and candidates in particular localities.

7.2.2. Volatile and homogeneous support with a high DTE

Explanations for which cases landed in this box would be complicated by the countries' diversity in terms of geography, political institutions, and economic development levels. It is also notable that each country represented in this box also has a party in the box just to the left (with high DH).

7.2.3. Stable but heterogeneous support, plus a high DTE

This box supports our earlier contention about the relative similarity in US and UK electoral behavior. There are other cases in the box, but recent events in Argentina could move the Peronists into a high volatility box, and Brazil's parties were more volatile previous to the period that our data cover.

7.2.4. Stable and homogeneous support, plus a high DTE

The cases in this box are remarkable in that they experience large swings in the vote at the district level, but maintain relatively low electoral volatility and DH. At least in Chile the very low volatility may well be a statistical anomaly, but the results here could suggest that the parties are very good at maneuvering their strong and weak candidates to maintain a consistent overall level of support.

7.2.5. Volatile and heterogeneous support with a low DTE

Uruguay's Broad Front typifies the lower left box, since the party has had much stronger support in Montevideo than in rural areas, but its rapid growth has been experienced throughout the country.

7.2.6. Volatile but homogeneous support with a low DTE

The mix of traits indicated by this box seems to typify a party-centric model, where voters (uniformly across districts) throw out or reward a party for its platform or deeds. The European countries in this box all have other parties with similar levels of the DTE and DH but lower levels of volatility (in the lower right box), while the Uruguayans have a counterpart with a slightly higher level of DH.

7.2.7. Stable but heterogeneous support, with a low DTE

The two Italian parties in the sample are the only two cases that fit into this box, and the results suggest an overlooked aspect of Italian politics. In particular, the low DTE, which results in spite of an open list system (in use during the period analyzed but changed in 1993), contrasts with studies that focus on factionalism, regional divisions, and particularistic politics.

7.2.8. Stable and homogeneous support, with a low DTE

The lower right box might be considered the mix of traits theorists presuppose are indicative of a consolidated political system. But the stability of regimes represented in other boxes, plus the fact that most of the cases here have a competitor with higher levels of volatility, might call this presumption into question.

8. Conclusion

Though traveling under different pseudonyms, the concepts of DH, volatility, and the DTE have long been at the center of debates about democratic stability and representation. In this paper we have argued that analyses of these concepts have been hampered by imprecise definitions, measurement techniques that are not broadly applicable, and important flaws in the statistical models. We therefore offer a new technique, commonly used in other areas of applied statistical research, that generates results at the party (or coalition) level and suggests more statistically precise specifications of the concepts that define electoral competition.

While we have focused significant attention on the relationships among the three concepts and methodological themes, this project has been driven by empirical concerns. For example, our DTE is directly related to the personal vote, a central concept to studies of electoral systems, but previously unmeasured in a comparative context (except by Stokes in his US-UK comparison). With this tool, then, we are able to quantify and compare the importance of local issues to elections. Even more generally, although DH, volatility, and the DTE are all considered relevant to democracy and often conjoined in the literature, we were able to show that there is neither a strong theoretical nor empirical link among these components. The data then allowed us to classify parties and party systems according to any or all three of these electoral traits. Our work calls into question the theoretical findings of other authors. For example, it suggests that there is no necessary relationship between any of the electoral traits or their combination on the one hand and political stability on the other. At the same time, most of the countries of the Americas sported a much higher DTE than found in Europe. If Schattschneider is right, this would have important implications for democratic functioning. On the other hand, given the growth of the DTE in the United States, the prosperity and political stability in the United States and Canada, and the improved political and economic situations in other high-DTE countries (e.g. Brazil and Chile), perhaps Schattshneider's concerns should be reconsidered.

Future analyses should also consider patterns in the data regarding DH. For example, in spite of Caramani's finding that nationalization has progressed throughout Europe, our results show that many parties' support levels are still quite variable across districts. The trend of increasing DH in the United States, however, perhaps suggests that state legislatures drew more districts with the intent of producing lopsided victories in the 1970s and 1980s than in the 1950s.

In terms of volatility, the data show that in most cases the time components in both Europe and the Americas are quite small. While the data set does not include some of the more volatile countries such as Ecuador, Bolivia, and Peru, this is still a particularly noteworthy finding for Latin America where parties have historically experienced high levels of volatility.

In moving towards an explanation of these and other patterns, future researchers will have to contend with variation among regions, as well as among and within countries. Some apparent variables, such as the use of single-member-district electoral systems, cannot explain intra-country differences or changes across time. A simple review of the cases also makes clear that the size of the party or the number of districts in a system cannot fully account for the size of any particular component in our analysis. Another seemingly fruitful direction for study would be to relate data about individual voters' perceptions of candidates, parties, and issues to our results based on aggregate voting outcomes.

Use of our methodology, in sum, provides a useful window on three types of variability exposed in district-level electoral data. While we leave the difficult task of analyzing the revealed patterns to future efforts, we would suggest that any full explanation will require a combination of macro or institutional variables to capture the inter-country and inter-regional differences and a set of variables that can differentiate amongst parties within a single country.

Acknowledgements

Appendix

The countries selected to test for our model were all those available in Caramani's dataset (the dataset is available on CD, though it has several serious errors which we corrected using Craig [1972, 1989] and other sources) and those in Latin America for which we could acquire data, plus the United States (data available through the Inter-University Consortium for Political and Social Research) and Canada (data published by the Chief Electoral Officer). With the two exceptions noted in footnote 12, we ran the analysis for the most recent time period in which there were at least

three consecutive elections in which the main parties did not change and there were no districting changes. We also required that the selected parties compete in all districts in all years. As a result, in countries such as France or Germany, where two or more parties joined in at least occasional alliances, we were forced to run the model as if the parties were always in alliance. For the single-member-district cases, we eliminated districts in which the two main parties did not each win at least 2.5% in each year. (We tested cutoff points up to 20% and, excepting zero, found minimal changes.) It was unnecessary to be as restrictive in cases where multiple parties competed under proportional representation, and thus we calculated estimates for some parties in spite of their support falling to under 2.5% (but not to zero) in some districts. A full listing of cases and of party and election details is available at our website, http://www.duke.edu/~smorgens/componentsinformation.html, which also has details about alternative means for handling uncontested races, an example of some calculations for Table 1, and other material.

References

American Political Science Association, Committee on Political Parties, 1950. Toward a More Responsible Two-Party System. Rinehart and Company, Inc, New York.

Bartolini, S., Mair, P., 1990. Identity, Competition, and Electoral Availability: The Stabilisation of European Electorates 1885–1985. Cambridge University Press, Cambridge.

Brady, D.W., D'Onofrio, R., Fiorina, M.P., 2000. The nationalization of electoral forces revisited. In: Brady, D.W., Cogan, J.F., Fiorina, M.P. (Eds.), Continuity and Change in House Elections. Stanford University Press, Stanford.

Cain, B., Ferejohn, J., Fiorina, M., 1987. The Personal Vote: Constituency Service and Electoral Independence. Harvard University Press, Cambridge.

Caramani, D., 2000. Elections in Western Europe since 1815: Electoral Results by Constituencies. Macmillan Reference, London.

Carey, J., Shugart, M.S., 1995. Incentives to cultivate a personal vote: a rank ordering of electoral formulas. Electoral Studies 14(4), 417–439.

Claggett, W., Flanigan, W., Zingale, N., 1984. Nationalization of the American electorate. American Political Science Review 78(1), 77–91.

Coppedge, M., 1998. The dynamic diversity of Latin American party systems. Party Politics 4(4), 547–568.

Craig, F. (Ed.), 1972. Boundaries of Parliamentary Constituencies, 1885–1972. Political Reference Publications, Chichester.

Craig, F. (Ed.), 1989. British Electoral Facts, 1832–1987. Parliamentary Research Services, Gower Publishing Company Limited, England.

Deming, W.E., Stephan, F.F., 1941. On the interpretation of censuses as samples. Journal of the American Statistical Association 36(213), 45–49.

Duverger, M., 1954. Political Parties. Wiley, New York.

Geddes, B., 1991. A game theoretic view of reform. American Political Science Review 85(2), 371–392.

Haggard, S., Kaufman, R.R., 1995. The Political Economy of Democratic Transitions. Princeton University Press, Princeton.

Jackson, S., Brashers, D.E., 1994. Random Factors in ANOVA. Sage, Thousand Oaks.

Jones, M.P., Mainwaring, S., 2003. The nationalization of parties and party systems: an empirical measure and an application to the Americas. Party Politics 9, 139–166.

Katz, R., 1973. The attribution of variance in electoral returns: an alternative measurement technique. American Political Science Review 67(3), 817–828.

Kawato, S., 1987. Nationalization and partisan realignment in congressional elections. American Political Science Review 81(4), 1235–1250.

Lipset, S.M., Rokkan, S., 1967. Cleavage structures, party systems, and voter alignments: an introduction. In: Lipset, S.M., Rokkan, S. (Eds.), Party Systems and Voter Alignments: Cross National Perspectives. The Free Press, New York, pp. 1–64.

Mainwaring, S.P., 1999. Rethinking Party Systems in the Third Wave of Democratization. Stanford University Press, CA.

Mainwaring, S., Scully, T.R., 1995. Introduction: party systems in Latin America. In: Mainwaring, S., Scully, T.R. (Eds.), Building Democratic Institutions: Party Systems in Latin America. Stanford University Press, Stanford.

Roberts, K.M., Wibbels, E., 1999. Party systems and electoral volatility in Latin America. American Political Science Review 93(3), 575–590.

Rose, R., Urwin, D.W., 1970. Persistence and change in western party systems since 1945. Political Studies 18(3), 287–319.

Shugart, M.S., Carey, J., 1992. Presidents and Assemblies. Cambridge University Press, Cambridge.

Stokes, D., 1965. A variance components model of political effects. In: Claunch, J.M. (Ed.), Mathematical Applications in Political Science. Arnold Foundation, Dallas.

Stokes, D., 1967. Parties and the nationalization of electoral forces. In: Chambers, W.N., Burnham, W.D. (Eds.), American Party Systems: Stages of Political Development. Oxford University Press, New York.

Stokes, D., 1973. Comment: on the measurement of electoral dynamics. The American Political Science Review 67(3), 829–831.